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UTAH MFDS Questions  
July 8, 2003

### **1- age of site**

- Initial investigation for siting MFDS began in early 60's. Kentucky became NRC Agreement State in **1962**.
- **1963** - Commonwealth issues a Radioactive Materials License to Nuclear Engineering Company (NECO) to operate Maxey Flats Disposal Site (MFDS)
- **1963 to 1971** - NECO operates MFDS. MFDS was operated in relative anonymity because of location in rural Eastern Kentucky.

### **2- construction of site, and any structures**

- Located on a flat-topped ridge bounded by steep hillsides and deeply incised valleys in the knobs physiographic region of East-Central Kentucky (Figure 1)
- MFDS property boundary encompasses 280 acres.
- Approximately 45 acres of the original MFDS property is Restricted Area utilized that was used for disposal operations
- Fifty-two (52) disposal trenches and one hot well occupy 27 acres of the Restricted Area. (Figure 2)
- Disposal trenches typically 40 feet wide, 200 feet long, and from 15 to 40 feet in depth.
- Trenches were excavated and blasted into bedrock.
- Bedrock primarily sandstone, siltstone, and shale of Mississippian age. Bedrock highly fractured.
- Disposal was "kick and roll" - barrels of liquid and solid waste pushed into trenches.
- Trenches were initially backfilled and graded.
- Trenches overflowed in '70's and HDPE liner was installed over the 27 acres encompassing trenches.
- Sumps were installed in trenches and in order to mitigate future overflow EPA led efforts to pump and evaporate HTO (tritiated water) in the 80's.
- Initially (1963-2001), only 3 maintenance structures within the 45 acre Restricted Area.
- Structures abandoned as part of site remedial activities in 2001-2.
- Bunker structures constructed in NW corner of the site in 1999-2000 as part of court ordered Consent Decree remedial activities (RA). (Figure 3)
- Leachate was pumped from trenches, solidified, and disposed of in bunkers 1998 - 2001 as part of RA.
- Bunkers and trenches covered with backfill/soil/ liner 2001-2 as part of RA.

- Grading, drainage improvement, and installation of site wide retention basin and flow control structures completed in 2002 as part of RA.

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### **3- rainfall/ groundwater levels**

- Humid temperate environment with 45-60 inches/yr. average rainfall.
- Vadose zone extend from surface thru regolith and generally uppermost shale bedrock.
- Saturated zone in highly fractured Lower (sandstone) Marker Bed (LMB) that lies immediately beneath or intersects base of trenches across the site.
- LMB intersects bottom of soil column along uppermost hillsides surrounding the Restricted Area.
- “Bathtub Effect” historically evident in trenches before placement of initial HDPE and initial HTO pumping.
- Water levels in trenches (sumps) and surrounding area (monitoring wells) equilibrated to levels approximating the LMB after direct infiltration into trenches mitigated by HDPE.
- Flow of groundwater from the Restricted Area and trenches is in highly-fractured LMB to base of soils along upper hillsides.
- Flow to and within any deeper saturated horizons restricted to very limited lateral extent. Deeper saturated horizons associated with largest “regional scale” fractures that cut thru hilltop/bedrock as identified with site-wide resistivity studies and monitored with wells.

### **4- soil composition**

- Residuum of shale/sandstone bedrock. High clay and iron content.
- Soils approximately 1-20’ thick on hilltop within Restricted Area. Zero (rock exposure in cliffs and ephemeral surface water courses that drain “Flat”) to 8’ thick on hillsides.

### **5- how the leak (if any) was contained**

- Initial releases discovered along hillside surface water drainage courses and in overland flow from overflowing trenches. Primarily HTO.
- Overland flow initially contained by pumping/HTO evaporator and placement of HDPE liner.
- Continued releases along surface water drainage courses and hillsides addressed by RA pumping/solidification/bunker disposal, capping, and Restricted Area drainage improvements.

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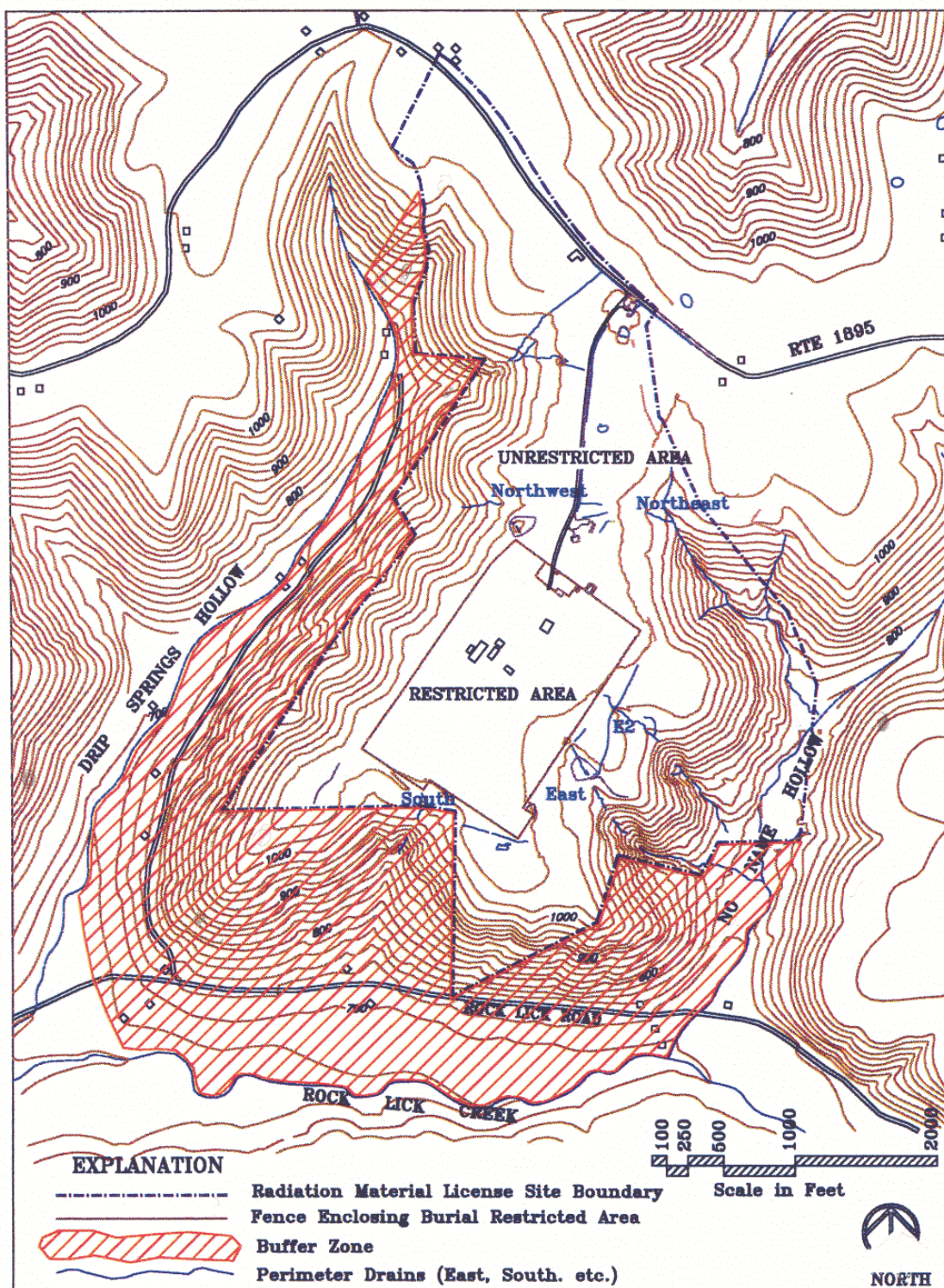
**6- damage to environment and any populations**

- **Since cessation of HTO evaporator operations, releases exceeding regulatory and health standards are contained within the MFDS property boundary.**

**7- waste types that were accepted**

- From 1963 to 1977 approximately 4.8 - 6.0 million cubic feet of low-level waste were disposed of in 46 trenches. This includes source material, special nuclear material, enriched plutonium, and unspecified radionuclear material.
- Most of the waste was in solid form; paper, glassware, shielding material, and carcasses. These materials were generally shipped to the site in wooden crates, cardboard boxes, and 55-gallon drums.
- Liquid wastes were accepted from 1963 to 1972. They were "solidified" with papier mache and disposed of in special liquids "L" trenches.
- Waste of high specific activity was placed in "hot" wells.
- It is estimated that in excess of 2.5 million Curies of by-product material has been discarded at MFDS.
- Primary contaminant at the site is Tritium (H<sub>3</sub>O).
- Other contaminants include 11 organics, As, Na, Mn, Tc<sub>99</sub>, U<sub>233,234,235,238</sub>, Pu<sub>238,239,240</sub>, Co<sub>60</sub>, Sr<sub>90</sub>, and Ra<sub>226</sub>.

Figure 1  
MAXEY FLATS SITE AREA MAP



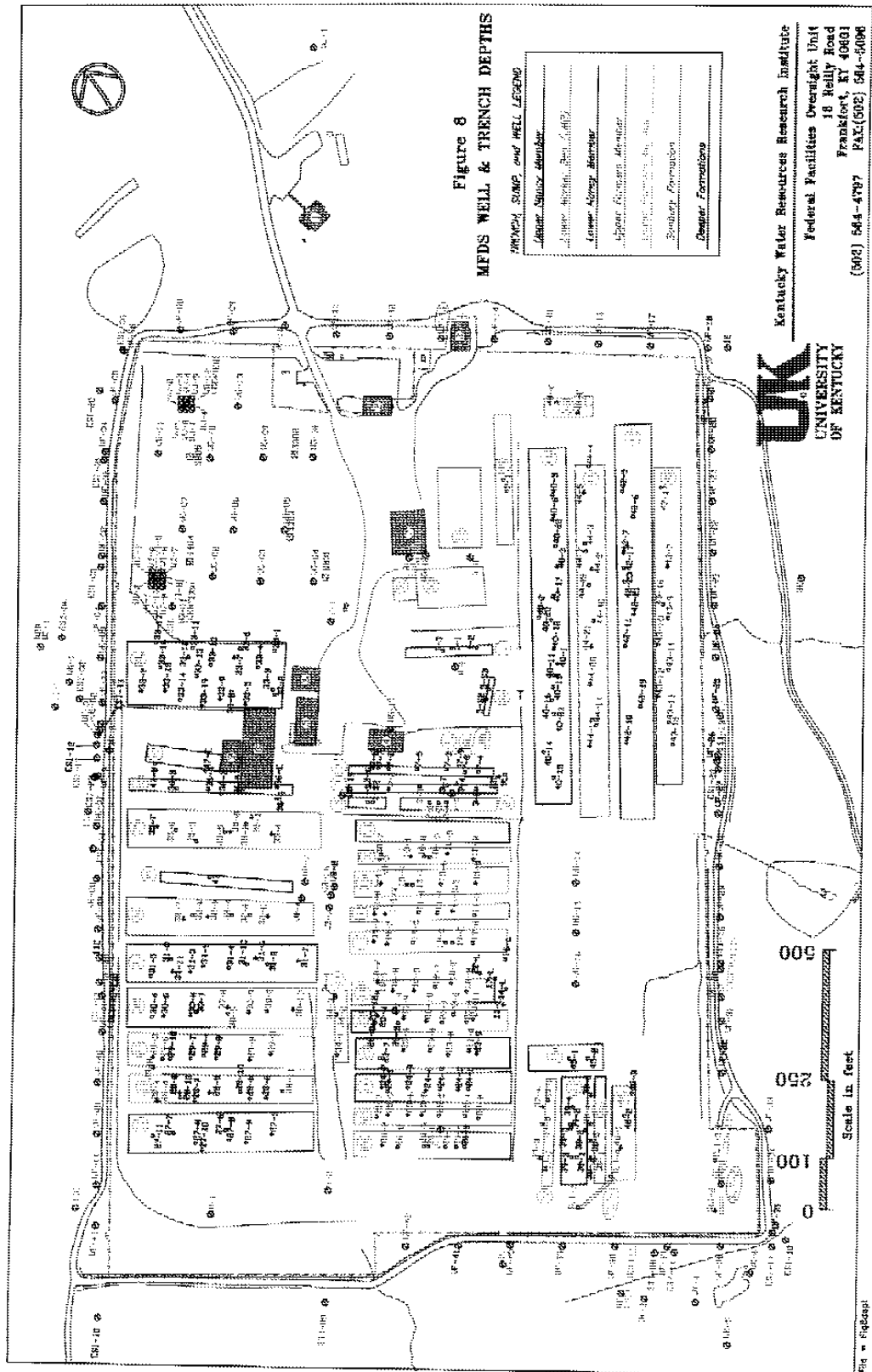


Figure 2. Restricted Area Map



**+Figure 3. Maxey Flats Disposal Site Aerial Photo.**



Lower right hand corner of picture is the NW Corner.

Gravel road roughly defines fences that bound 45 acre Restricted Area.

Bunkers for solidified leachate disposal are under construction in the photo.

Black is HDPE liner over trenches.

Small white dots on HDPE are sumps into trenches, large white are leachate conveyance tanks.

Photo circa 2000.